REMARKS

Claims 1-40 are in the application. Claims 1, 15, and 24 are amended to emphasize distinctions over cited art and for improved clarity. New Claims 38-39 are introduced to claim a specific feature of Applicants' invention, namely, that the matrix may comprise two or more layers of materials; see, e.g., paragraph 0034. New Claim 40 is directed to an embodiment comprising isolated segments of a first material embedded in a matrix of a second material, as disclosed, for example, in paragraph 0036.

Claims 1-3, 10, 13, 14, 31, and 32 are rejected under 35 USC 102(e) as being anticipated by Li et al (U.S. Patent 6,831,017).

Li et al disclose catalyst patterning for nanowire devices. Nanowire devices are provided that are based on carbon nanotubes or single-crystal semiconductor nanowires. The nanowire devices are formed on a substrate. Catalyst sites are formed on the substrate, and nanowires grown from the catalyst sites. The nanowires may be encased in an insulating layer 20 (Col. 5, lines 43-55 and Col. 6, lines 29-49).

However, Li et al utterly fail to disclose or suggest the growth of at least two different materials to form the nanowires. Their nanowires comprise a single material.

Claim 1 is amended by requiring the presence of at least two different materials to form each of the nanowires. Claim 4 specifically recites "two materials". Such amendment obviates the rejection with regard to Claims 1-3, 10, 13, and 14.

With regard to Claims 31-32, Li et al utterly fail to disclose or even remotely suggest embedding ***segments*** in a matrix. LI et al disclose only embedding the ***nanowires*** in an insulating layer; there is no disclosure or suggestion that segments of the nanowires may be embedded in a layer. The Examiner's attention is respectfully directed to Applicants' FIG. 3c, wherein is shown a plurality of nanowires, each nanowire comprising alternating segments 18a, 18b of dissimilar materials. Where one of the materials, e.g., 18a, is of the same material as the matrix 20, then segments 18b will be seen to be "floating" or embedded in the matrix. In contrast, Li et al only show nanowires 18 extending upward from a substrate 14 and surrounded by their matrix 20 (e.g., their Fig. 2d); no isolated segments of the nanowires are shown nor are any such isolated segments disclosed or suggested.

Reconsideration of the rejection of Claims 1-3, 10, 13, 14, and 31, as amended, under 35 USC 102(e) as being anticipated by Li et al is respectfully requested.

Claims 4-7, 11, 12, 15-18, 20-30, and 33-37 are rejected under 35 USC 103(a) as being unpatentable over Li et al in view of Gudiksen et al (Nature article).

The Li et al reference is discussed above. Gudiksen et al, cited by Applicants in their Information Disclosure Statement filed with the application, disclose the growth of nanowire superlattice structures for nanoscale photonics and electronics.

Applicants' independent claims are amended to emphasize that a three-dimensional assembly of isolated nanowires is ***controllably*** formed, with each nanowire comprising at least two materials, within a matrix of another material. In the method, a two-dimensional catalyst array is formed, and an array of nanowires is grown in the third dimension (perpendicular to the substrate). These aspects are supported in FIG. 3c and the discussion associated therewith.

The Examiner argues that Li et al teaches a method and product of nanowires, comprising forming a pattern of catalyst (e.g., gold) and then source materials are flowed over the substrate and caused to decompose to grow the nanowires, such as by MOCVD, which nanowires may be silicon, II-VI or III-V. After the nanowire growth, a material, which the Examiner acknowledges is insulating, is deposited around the nanowires.

The Examiner admits that Li et al differ from the filed claims in the nanowire having two materials, and cites Gudiksen et al for its teaching the growth of nanowires with two separate materials.

Applicants note that Li et al disclose forming an assembly of nanowires comprising a single material in a matrix of another material, which is an insulator. There is no disclosure of ***controllably*** growing in the third dimension. The use by Li et al of CMP to shorten the nanowires indicates that they do not rely on control in the third dimension. They do not attempt to change the composition along the nanowire, and therefore, there is no controllable growth in the third (Z) dimension.

In direct contrast, Applicants form an assembly of nanowires comprising at least two materials, embedded in a matrix. Applicants ***controllably*** grow their nanowires in the third dimension; see, e.g., paragraph 0013, line 2, as well as paragraph 0034, which discloses alignment of segments with layer in matrix, which requires control, and paragraphs 0039 and 0041, which discloses control in all three

dimensions. Control of thickness of each segment (Z-direction) and also orientation perpendicular (or at a specified angle) to the substrate is implied because the characteristics of devices Applicants are building depend on control in the third dimension. The characteristics of such devices would vary from device to device and would depart from the design criteria if not controlled; e.g., the characteristic energies of a quantum dot or light guiding of a photonic crystal in the third (Z) dimension would exhibit unacceptable behavior.

Gudiksen et al disclose the growth of nanowires comprising two materials, but not in a matrix. Further, Gudiksen et al fail to disclose any controllability over the growth of their nanowires, which grow at a variety of uncontrolled angles to the substrate. There is no attempt to control the angle of growth (namely, essentially normal to the surface) nor the relative geometry of the wires. This is evidenced by the fact that Gudiksen et al sonicate their nanowires to remove them from the substrate and then disperse them in a liquid.

Applicants' claims, as amended, clearly distinguish over this combination of references.

Reconsideration of the rejection of Claims 1, 4-7, 11, 12, 15-18, 20-30, and 33-37, as amended, under 35 USC 103(a) as being unpatentable over Li et al in view of Gudiksen et al is respectfully requested.

Claims 4-7, 11, 12, 15-18, 20-30, and 33-37 are rejected under 35 USC 103(a) as being unpatentable over Li et al in view of Gudiksen et al (Nature article). Claim 26 is canceled.

Li et al and Gudiksen et al are discussed above.

Here, the references are relied upon as above. The Examiner admits that the two references differ from the instant claims with regard to the mold for the catalyst.

Only Claims 8 and 19 are specifically directed to a mold for forming a pattern of catalyst on the substrate. Since these claims are not included in the rejection, Applicants fail to understand how the claims dealing with the mold are not included in the rejection, while the claims not dealing with the mold are rejected over the two references, neither of which disclose using a mold to form the pattern of catalyst. Indeed, neither reference discloses how to form the pattern of catalyst. Applicants further note that they claim an alternative method for forming the pattern of catalyst,

namely, a two-step imprinting process (Claim 9). Applicants would appreciate clarification of this rejection.

Reconsideration of the rejection of Claims 1, 4-7, 11, 12, 15-18, 20-24, 27-30, and 33-37, as amended, under 35 USC 103(a) as being unpatentable over Li et al in view of Gudiksen et al is respectfully requested.

The foregoing amendments and arguments are submitted to place the application in condition for allowance. The Examiner is respectfully requested to take such action. If the Examiner has any questions, he is invited to contact the undersigned at the below-listed telephone number. HOWEVER, ALL WRITTEN COMMUNICATIONS SHOULD CONTINUE TO BE DIRECTED TO: IP ADMINISTRATION, LEGAL DEPARTMENT, M/S 35, HEWLETT-PACKARD COMPANY, P.O. BOX 272400, FORT COLLINS, CO 80527-2400.

Respectfully submitted,

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David W. Collins
Reg. No. 26,857
Attorney for Applicants

512 E. Whitehouse Canyon Rd.
Suite 100
Green Valley, AZ 85614

Telephone calls may be made to:
(520) 399-3203